Candidate surname | Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | Candidate Number

Tuesday 5 November 2019

Morning (Time: 1 hour 30 minutes) | Paper Reference **1MA1/1F**

Mathematics
Paper 1 (Non-Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

.CG Maths.
Worked Solutions

Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write down the value of the 7 in the number 1074

The 7 is in the tens place so is worth 7 tens

70

(Total for Question 1 is 1 mark)

2 Write 4.58 correct to 1 decimal place.

The 5 rounds up to a 6 due to the 8 in the next decimal place. Everything after the first decimal place is then set to 0 and ignored

4.6

(Total for Question 2 is 1 mark)

3 Work out 31.7×100

Multiplying by 100 moves the decimal point twice to the right

3170

(Total for Question 3 is 1 mark)

4 Write the fraction $\dfrac{28}{70}$ in its simplest form.

$\dfrac{14}{35}$ ← *Dividing both the numerator and denominator by 2*

Dividing both the numerator and denominator by 7 → $\dfrac{2}{5}$

(Total for Question 4 is 1 mark)

5 Write 15% as a decimal.

To convert a percentage to decimal divide it by 100. This moves the decimal point twice to the left
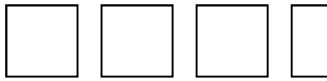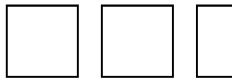
0.15

(Total for Question 5 is 1 mark)

2

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6 The pictogram shows information about the number of pictures sold in an art shop in each of January, February and March.

January	☐ ☐ ☐
February	☐ ☐ ☐ ⊏
March	☐ ☐ ⊏
April	☐ ⊏

Key:

☐ represents 8 pictures

(a) Write down the number of pictures sold in January.

There are 3 whole symbols and each one represents 8 pictures. 3 x 8 = 24

..............24.............
(1)

12 pictures were sold in April.

(b) Show this information on the pictogram.

$$8\overline{)12.0}$$
0 1 . 5

This works out that 1.5 symbols represents 12

(1)

(c) What was the total number of pictures sold in these four months?

$$\begin{array}{r} 10.5 \\ \times \quad 8 \\ \hline 84.0 \end{array}$$

There are 10.5 symbols in total for these four months and each one represents 8 pictures

..............84.............
(2)

(Total for Question 6 is 4 marks)

7 Work out the difference, in minutes, between 1 hour 25 minutes and $1\frac{1}{4}$ hours.

$$4\overline{)6\,^{2}0}$$
1 5

There are 60 minutes in an hour. This works out than there are 15 minutes in 1/4 of an hour

The hours can be ignored as they are both the same. So just working out the difference in the minutes. Difference = largest - smallest = 25 - 15 = 10

..............10.............. minutes

(Total for Question 7 is 2 marks)

.CG Maths.

8 Prasha has five blocks of wood.

The total weight of all five blocks of wood is 3 kilograms.
4 of the blocks of wood each have a weight of 650 grams.

Work out the weight, in grams, of the other block of wood.

$$\begin{array}{r} 650 \\ \times \quad 4 \\ \hline 2600 \end{array}$$

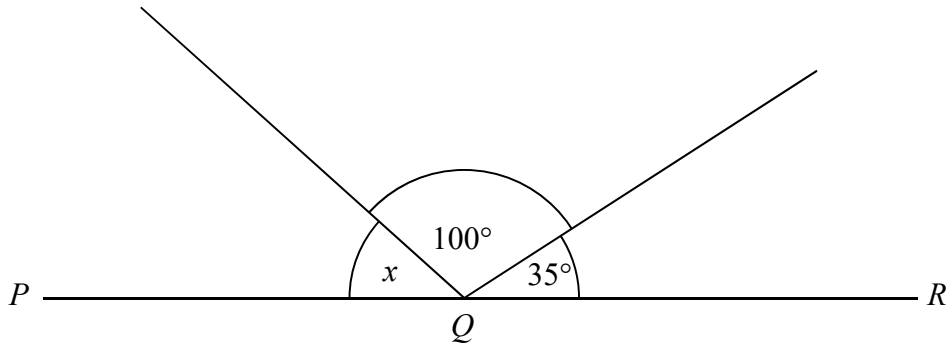This works out the total weight of the 4 blocks of wood

$$\begin{array}{r} 3000 \\ -2600 \\ \hline 400 \end{array}$$

Subtracting the weight of the 4 blocks from the total weight of all five leaves the weight of the other block of wood. There are 1000g in 1kg so 3kg is 3000g

.... 400 .... grams

(Total for Question 8 is 3 marks)

9 *PQR* is a straight line.

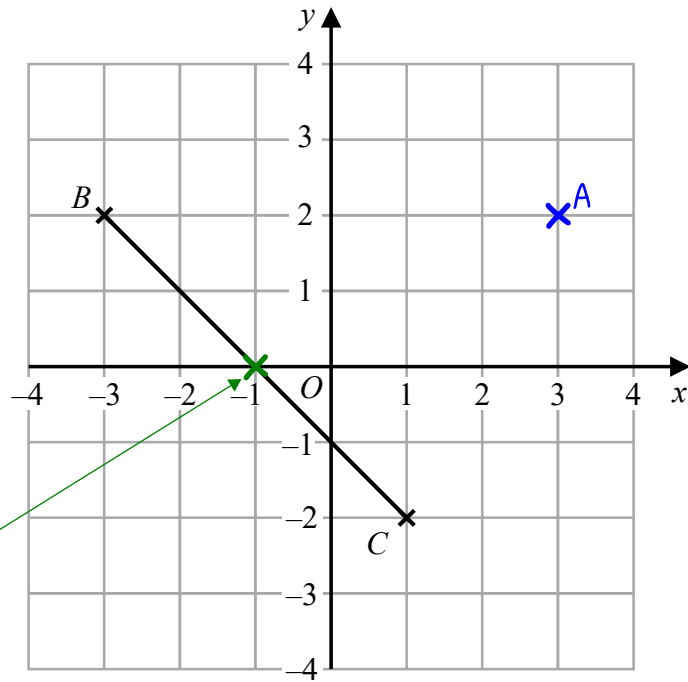Work out the size of angle *x*.

$$\begin{array}{r} 180 \\ -100 \\ - \quad 35 \\ \hline 45 \end{array}$$

There are 180° in total around a point on a straight line. Subtracting the other angles leaves x

.... 45 .... °

(Total for Question 9 is 2 marks)

4

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10

The midpoint of BC is here

(a) Plot the point with coordinates (3, 2)
Label this point *A*.

(1)

(b) Write down the coordinates of the midpoint of *BC*.

(...... −1 ...... , ... 0 ......)

(1)

(Total for Question 10 is 2 marks)

11 Mason throws a coin 3 times.
The outcome of each throw is either Heads or Tails.

List all the possible outcomes of the 3 throws.

HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

The outcomes are systematically listed

(Total for Question 11 is 2 marks)

12 Rehan is on holiday in the USA.

He has $200 to spend on clothes.

Rehan buys
  1 pair of trainers costing $60
  3 T-shirts costing $25 each.

He also wants to buy a jacket costing $80

(a) Has Rehan got enough money to buy the jacket?
   You must show how you get your answer.

$$\begin{array}{r} 25 \\ \times\ 3 \\ \hline 75 \end{array}$$

← *Working out the total cost of the 3 t-shirts*

$$\begin{array}{r} 200 \\ -\ 60 \\ -\ 75 \\ \hline 65 \end{array}$$

← *Subtracting the cost of the trainers and 3 t-shirts from the amount of money he has leaves the amount of money he has left for the jacket*

No ← *$65 is not enough to buy the jacket as $80 is more than this*

(3)

The trainers cost $60
The exchange rate is $1 = £0.749

Rehan says,
  "The trainers cost less than £40"

Rehan is wrong.

(b) Using a suitable approximation, show working to explain why.

$$\begin{array}{r} 60 \\ \times\ 0.7 \\ \hline 42.0 \end{array}$$

← *Rounding the exchange rate down to $1 = £0.70 works out that the trainers would cost £42. This is an underestimate so the trainers must cost more than £42 so cannot be less than £40*

(2)

(Total for Question 12 is 5 marks)

.CG Maths.

13 (a) Simplify $2a \times 5b$

The multiplication can be done in any order so the 2 x 5 can be done first. Then the letters can be written next to the 10 to mean that they are multiplied

10ab

(1)

(b) Simplify $3x + 2y + 5x - y$

Simplified by collecting the like terms. 3x + 5x = 8x. 2y - y = y

8x+y

(2)

(Total for Question 13 is 3 marks)

14 Work out 23×15

```
  23
× 15
 115
 230
 345
```

345
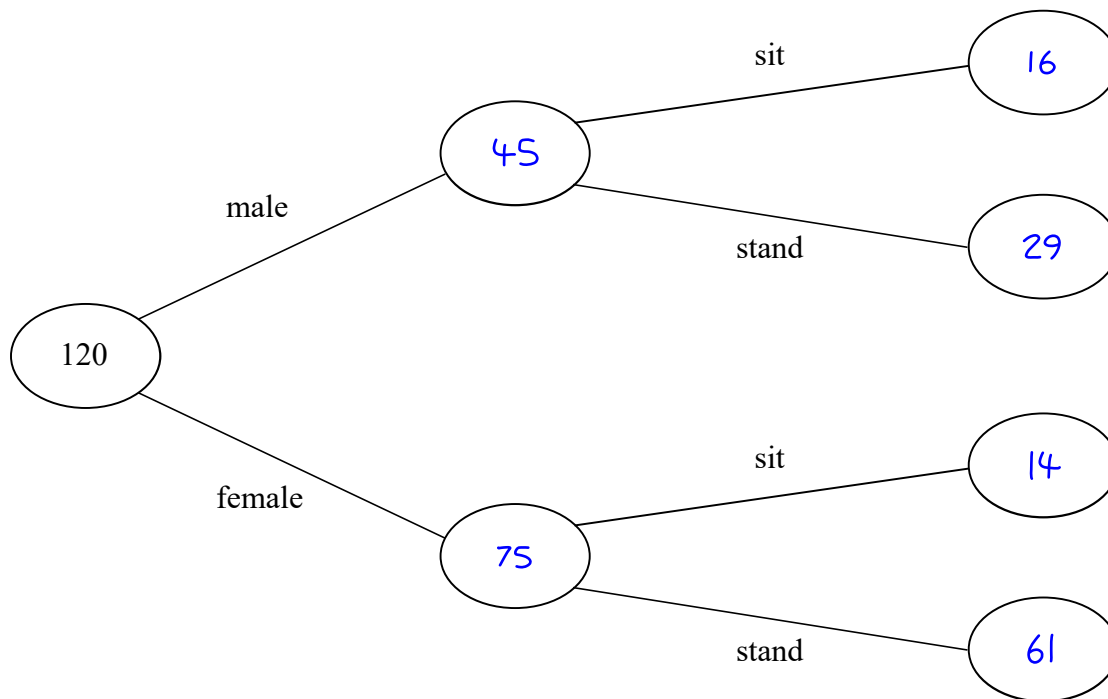
(Total for Question 14 is 2 marks)

.CG Maths.

15 120 people were at a hockey match.

Each person was asked if they wanted to stand or to sit to watch the match.

75 of the people were female
29 of the males wanted to stand
30 of the people wanted to sit

$$\begin{array}{cccc} 1\cancel{2}0 & \cancel{4}5 & \cancel{3}0 & 75 \\ -75 & -29 & -16 & -14 \\ \hline 45 & 16 & 14 & 61 \end{array}$$

(a) Use this information to complete the frequency tree.

(3)

One of the 120 people is chosen at random.

(b) Write down the probability that this person is a male who wanted to stand.

29 out of the 120 people were male who wanted to stand

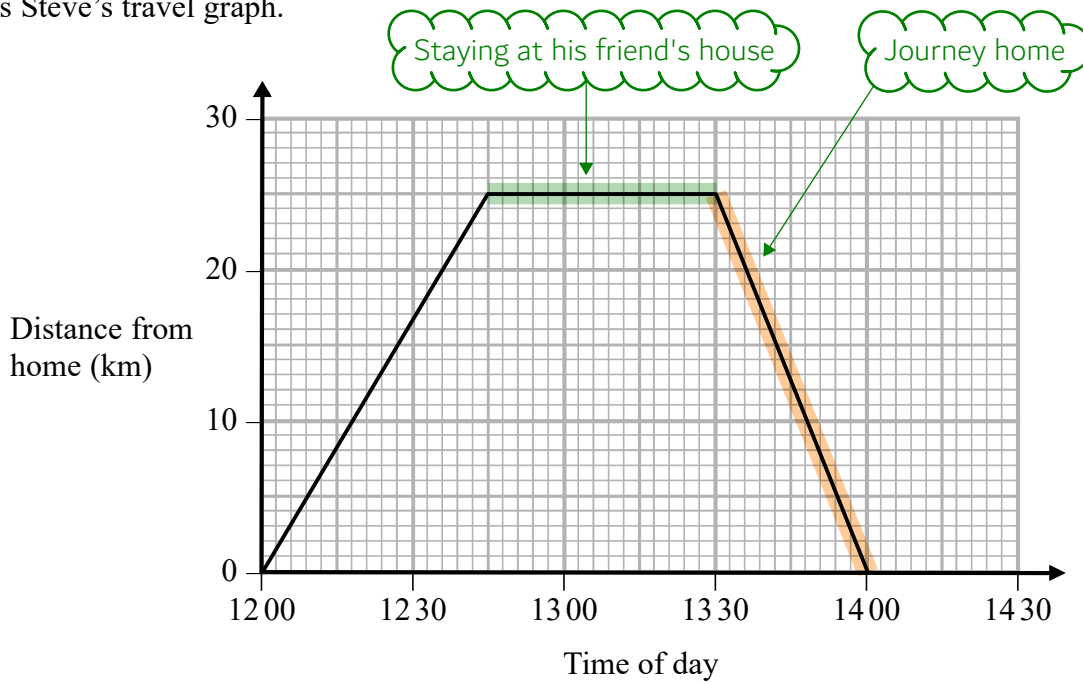$\dfrac{29}{120}$

(1)

(Total for Question 15 is 4 marks)

.CG Maths.

16 Steve drove from his home to his friend's house.
He stayed at his friend's house and then drove home.

Here is Steve's travel graph.

Staying at his friend's house

Journey home

Distance from home (km)

30

20

10

0

12 00   12 30   13 00   13 30   14 00   14 30

Time of day

(a) For how many minutes did Steve stay at his friend's house?

$\begin{array}{r} 15 \\ \times 3 \\ \hline 45 \end{array}$

The scale goes up 30 minutes over 10 small boxes. 30/10 = 3 so each small box is worth 3 minutes. The distance didn't change for 15 small boxes and this must be when he stayed at his friend's house

.........45......... minutes

(1)

(b) What was Steve's average speed on his journey home?

$25 \div \frac{1}{2}$ ← The unit of km/h means to divide the number of kilometres travelled by the time taken in hours. He travelled 25 kilometres in 30 minutes. There are 60 minutes in an hour and 30/60 = 1/2 so this is 1/2 an hour

$\begin{array}{r} 25 \\ \times 2 \\ \hline 50 \end{array}$ ← To divide by a fraction, keep the first part, change the symbol to multiplication, and flip the second fraction. 2/1 is 2

.........50......... km/h

(2)

(Total for Question 16 is 3 marks)

.CG Maths.

17 $x - 1 = 2$

Work out the value of $2x^2$

$x = 3$ ⟵ Adding 1 to both sides makes x the subject

2×3^2 ⟵ Substituting 3 for x in in $2x^2$

.... 18 ....

(Total for Question 17 is 3 marks)

.CG Maths.

18 The pie charts show information about the favourite animal of each student at school **A** and of each student at school **B**.

School **A**

monkeys

$60°$

$x°$

lions

$x°$

tigers

School **B**

tigers

monkeys

$160°$

$110°$

lions
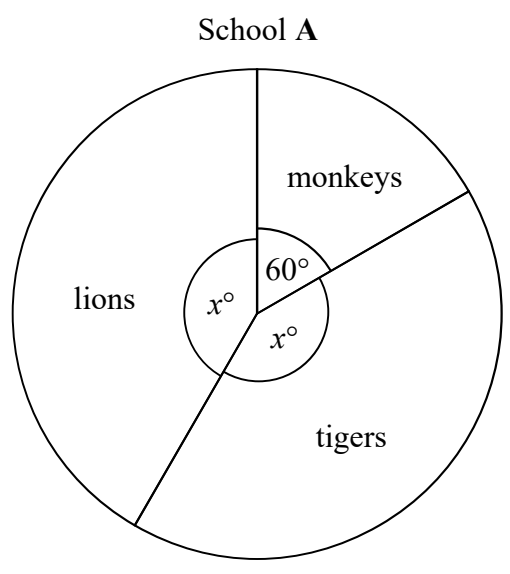
There are 480 students at school **A**.   There are 760 students at school **B**.
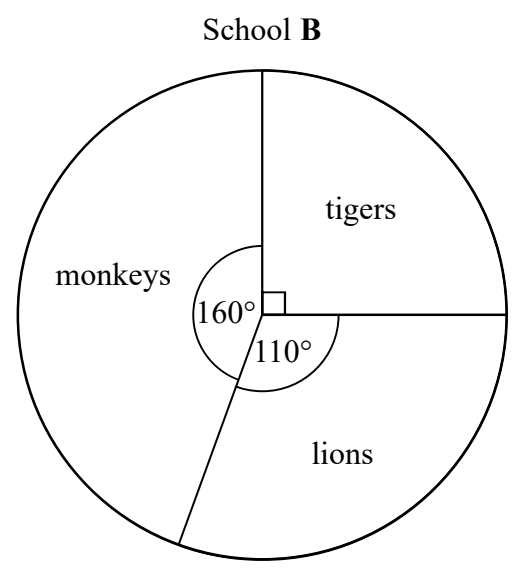
Henry says,

"The same number of students at each school have tigers as their favourite animal."

Is Henry correct?
You must show how you get your answer.

$\frac{360-60}{2} = 150$ ← There are 360° in total in a pie chart. Subtracting the 60° leaves the number of degrees for both of the x angles. These are both equal so the result can be divided by 2 to work out one of the x angles. 360 - 60 = 300. 300/2 = 150

$\frac{150}{360} = \frac{15}{36} = \frac{5}{12}$ ← Expressing the 150° representing tigers in school A as a fraction of the total 360°. Then simplifying the fraction by dividing both the numerator and denominator by a common factor

$\frac{040 \times 5 = 200}{12\overline{480}}$ ← Working out 5/12 of the 480 students in school A to work out that 200 have tigers as their favourite animal

$\frac{90}{360} = \frac{9}{36} = \frac{1}{4}$ ← Expressing the 90° representing tigers in school B as a fraction of the total 360°. Then simplifying the fraction by dividing both the numerator and denominator by a common factor
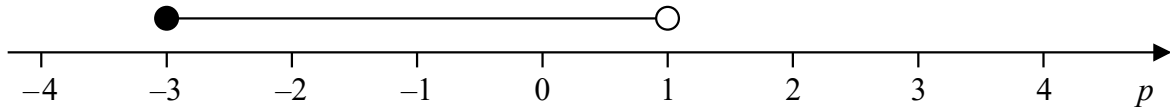
$\frac{190}{4\overline{760}}$ ← Working out 1/4 of the 760 students in school B to work out that 190 have tigers as their favourite animal

No ← The 200 who have tigers as their favourite animal in school A is not the same as the 190 who have tigers as their favourite animal in school B

(Total for Question 18 is 4 marks)
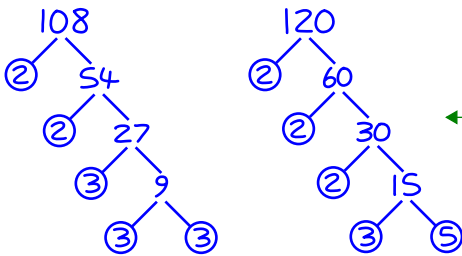
19 Here is a number line.

Write down the inequality shown on the number line.

The line goes to the right of -3 so p is greater than -3. p can also be equal to -3 as the dot is closed. The line goes to the left of 1 so p is less than 1. p cannot be equal to 1 as the dot is open

$-3 \leq P < 1$

(Total for Question 19 is 2 marks)

20 Find the Lowest Common Multiple (LCM) of 108 and 120

Doing factor trees for both 108 and 120 to express them as product of prime factors. $108 = 2^2 \times 3^3$. $120 = 2^3 \times 3 \times 5$

$2^3 \times 3^3 \times 5$

The Lowest Common Multiple is the highest power of each prime multiplied together

$2^3 = 2 \times 2 \times 2 = 8$. $3^3 = 3 \times 3 \times 3 = 27$. Multiplying these together then multiplying by the 5

$$\begin{array}{r} 27 \\ \times\ 8 \\ \hline 216 \\ {\scriptstyle 5} \end{array}$$

$$\begin{array}{r} \times\ \ 5 \\ \hline 1080 \\ {\scriptstyle 3} \end{array}$$

1080

(Total for Question 20 is 3 marks)

.CG Maths.

21 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir $= n : 1$

Work out the value of n.
You must show how you get your answer.

30 ← Half of 60 is 30 so there are 30 women

10 ← The 30 women is 3 times the number of men so there are 10 men as 10 x 3 = 30

20:10 ← There are 20 children as 60 - 30 - 10 = 20. Writing the number of children to the number of men as a ratio

2:1 ← Simplifying the ratio by dividing both sides by 10 gives 2 : 1 so n is 2

$n = $ ....2.............

(Total for Question 21 is 4 marks)

22 Work out $1\frac{3}{4} \times 1\frac{1}{3}$

Give your answer as a mixed number.

$\frac{7}{4} \times \frac{4}{3}$ ← Converting the mixed numbers into improper fractions by multiplying the whole numbers by the denominators then adding the results to the numerators. This makes it easier to multiply
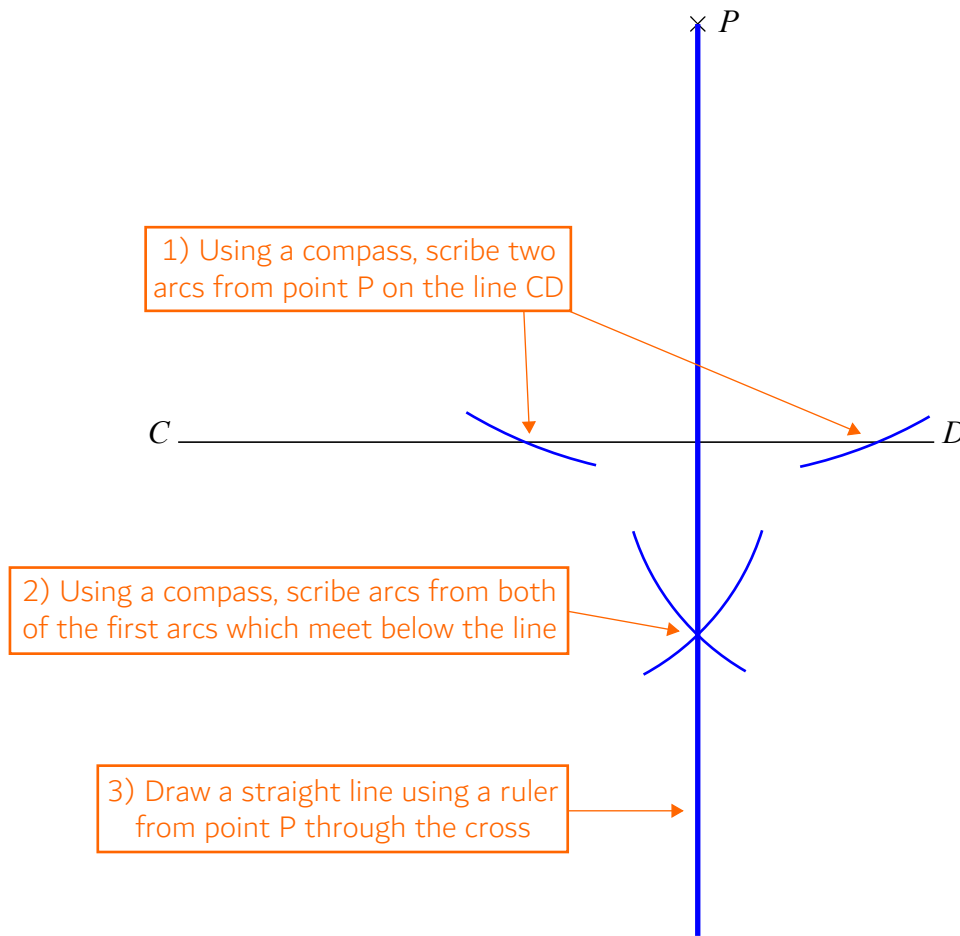
$\frac{28}{12}$ ← Multiplied the fractions by multiplying the numerators and denominators

Converted into a mixed number by considering that 12 goes into 28 2 times with a remainer of 4. The 2 is the whole number and the remainder of 4 is left in the fraction

$2\frac{4}{12}$

(Total for Question 22 is 3 marks)

23 Use a ruler and compasses to construct the line from the point P perpendicular to the line CD.
You must show **all** construction lines.

$\times P$

1) Using a compass, scribe two arcs from point P on the line CD

C ———————————————— D

2) Using a compass, scribe arcs from both of the first arcs which meet below the line

3) Draw a straight line using a ruler from point P through the cross

(Total for Question 23 is 2 marks)

.CG Maths.

24 The diagram shows triangle *ABC*.

A

75°

D

51°

B   C
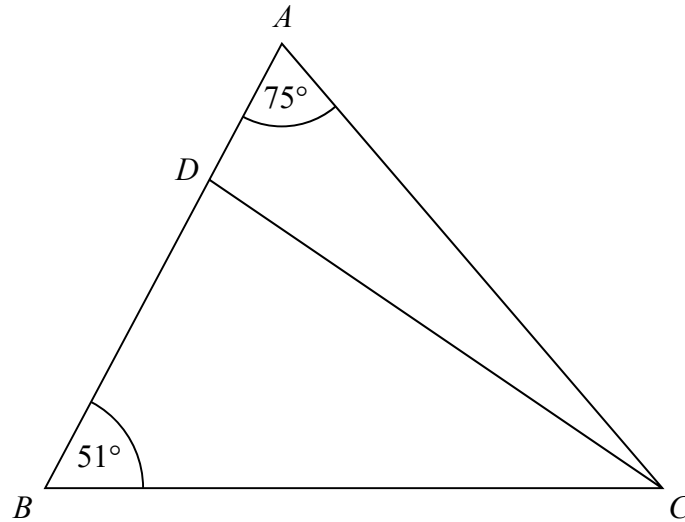
ADB is a straight line.

the size of angle *DCB* : the size of angle *ACD* = 2 : 1

Work out the size of angle *BDC*.

$\begin{array}{r} 1\overset{7}{\cancel{8}}0 \\ -75 \\ -51 \\ \hline 54 \end{array}$

Angles in a triangle add up to 180°. So subtracting the other angles in triangle ABC leaves angle ACB

$\begin{array}{r} 1\ 8 \\ 3\overline{|5\ 4} \end{array}$

Angle ACB is the total of angles DCB and ACD. This is represented by 3 parts in the ratio as 2 + 1 = 3 so dividing it by 3 works out the value of 1 part

$\begin{array}{r} 18 \\ \times\ 2 \\ \hline 36 \\ \scriptstyle 1 \end{array}$

Angle DCB is worth 2 parts in the ratio so multiplying the value of 1 part by 2 works out the angle DCB

$\begin{array}{r} 1\overset{7}{\cancel{8}}0 \\ -36 \\ -51 \\ \hline 93 \end{array}$

Angles in a triangle add up to 180°. So subtracting the other angles in triangle DBC leaves angle BDC

.................93................. °

(Total for Question 24 is 4 marks)

.CG Maths.

25 4 red bricks have a mean weight of 5 kg.
5 blue bricks have a mean weight of 9 kg.
1 green brick has a weight of 6 kg.

Donna says,

"The mean weight of the 10 bricks is less than 7 kg."

Is Donna correct?
You must show how you get your answer.

m^t_n ← Mean = total/number, where total is the total weight and number is the number of bricks. Writing this as a formula triangle

4×5
5×9
← From the formula triangle, total = mean x number. This works out the total weight of the red bricks and the total weight of the blue bricks

20
+45
+ 6
71 ÷ 10 = 7.1
← Adding together the total weight of all of the bricks works out that the total weight of all of the bricks is 71kg. There are 10 bricks so dividing this by 10 works out the mean weight of the 10 bricks

No ← The mean is 7.1kg, which is not less than 7kg

(Total for Question 25 is 3 marks)

.CG Maths.

26 (a) Simplify $(p^2)^5$

$(a^x)^y = a^{xy}$

p^{10}

(1)

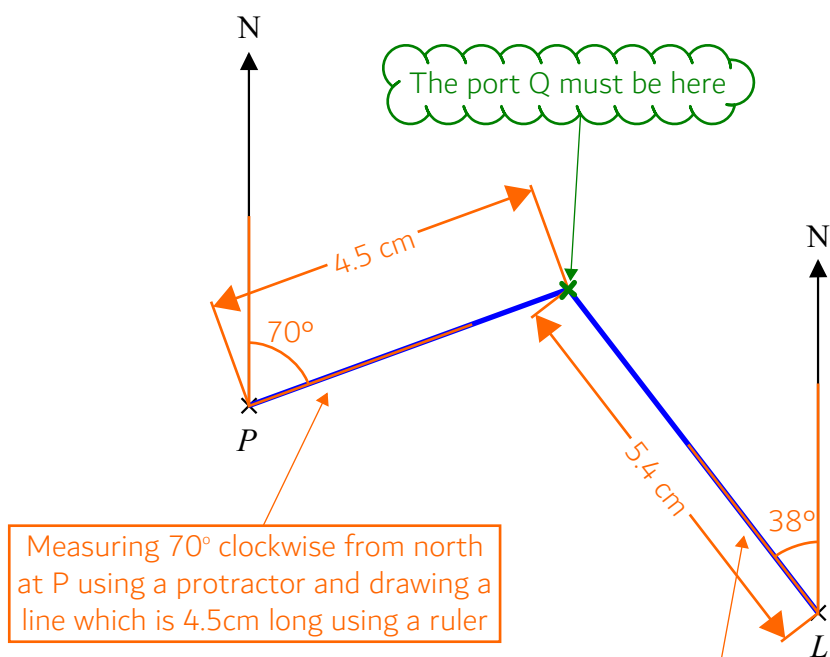(b) Simplify $12x^7y^3 \div 6x^3y$

$12/6 = 2.\ x^7/x^3 = x^4.\ y^3/y = y^2$

$2x^4y^2$

(2)

(Total for Question 26 is 3 marks)

.CG Maths.

27 The accurate scale drawing shows the positions of port *P* and a lighthouse *L*.

N

The port Q must be here

4.5 cm

70°

N

5.4 cm

38°

P

L

Measuring 70° clockwise from north at P using a protractor and drawing a line which is 4.5cm long using a ruler

Scale: 1 cm represents 4 km.

Drawing a line from the port Q to the lighthouse L then measuring its length using a ruler. Measuring the anticlockwise angle from north at L

Aleena sails her boat from port *P* on a bearing of 070°

She sails for $1\frac{1}{2}$ hours at an average speed of 12 km/h to a port *Q*.

Find

    (i) the distance, in km, of port *Q* from lighthouse *L*,

    (ii) the bearing of port *Q* from lighthouse *L*.

$s\frac{d}{t}$ ← Writing the formula triangle for distance, speed and time

$12 \times 1\frac{1}{2}$ ← From the formula triangle, distance = speed x time. Working out the distance she sailed to port Q. 1 x 12 = 12. 1/2 x 12 = 6. 12 + 6 = 18

$\begin{array}{r} 04.5 \\ 4\overline{)1\,18.20} \end{array}$ ← Every 4km is represented by 1cm so dividing the distance by 4 works out how many centimetres represent it

$\begin{array}{r} 5.4 \\ \times\ \ 4 \\ \hline 21.6 \end{array}$ ← Every 1cm represents 4km so multiplying the measured distance by 4 works out the actual distance in kilometres

$\begin{array}{r} 3\,6\,0 \\ -\ \ 38 \\ \hline 3\,22 \end{array}$ ← Subtracting the anticlockwise angle from north at L from 360 works out the bearing

distance *QL* = ... 21.6 .... km

bearing of *Q* from *L* = ... 322 .... °

(Total for Question 27 is 5 marks)

.CG Maths.

28 The diagram shows triangle *AOB*.
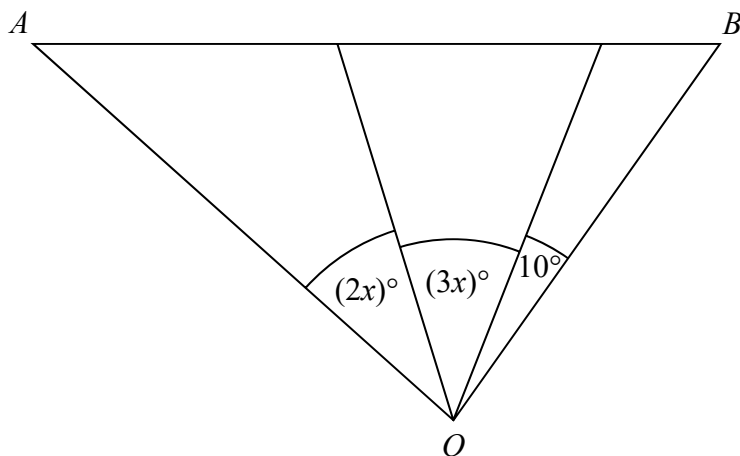
Angle *AOB* is **not** an obtuse angle.

Find the greatest value of *x*.
You must show all your working.

$2x + 3x + 10 = 90$ ← x is greatest when angle AOB is greatest. Obtuse angles are more than 90° but less than 180°. As it is not obtuse, the greatest angle AOB can be is 90° as the angle cannot possibly be 180° or more as there are only 180° in a triangle. Adding all of the angles together and setting it equal to the 90° to create an equation in terms of x which can be solved

$5x = 80$ ← Simplifying by collecting like terms. 2x + 3x = 5x. Then subtracting 10 from both sides to get the x term on its own
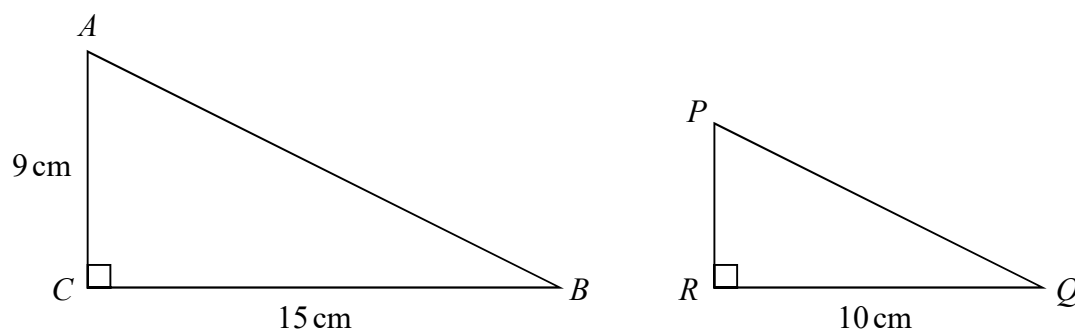
$5 \overline{)80}$ = 16 ← Dividing both sides by 5 works out x

16

(Total for Question 28 is 3 marks)

29 *ABC* and *PQR* are similar right-angled triangles.

A

9 cm

C   15 cm   B

P

R   10 cm   Q

angle *ABC* = angle *PQR*

(a) Work out the length of *PR*.

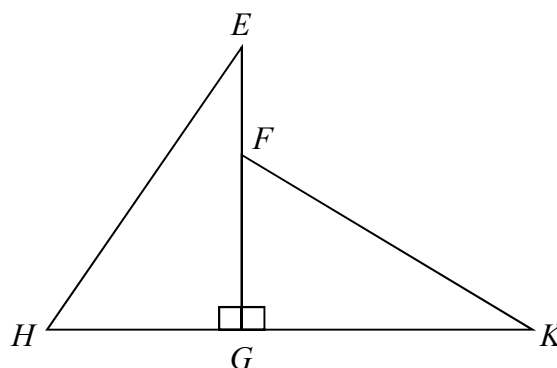$\frac{10}{15}$ ← Expressing the fraction of the larger triangle the smaller triangle is

$\frac{2}{3} \times 9$ ← Simplifying the fraction and doing that fraction of the side AC, which is the larger version of PR

.... 6 .... cm

(2)

Triangle *EGH* is congruent to triangle *KGF*.

E

F

H   G   K

HK = 10 cm.
HG = 4 cm.

(b) Work out the length of *EF*.

10−4 ← Subtracting HG from HK works out GK, which is the same as GE

6−4 ← Subtracting FG, which is the same as HG, from GE works out EF

.... 2 .... cm

(2)

(Total for Question 29 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

.CG Maths.